IIT Mandi
Proposal for a New Course

Course number : EE223P
Course Name : Reverse Engineering
Credit : 1
Distribution : *0-0-2-1*
Intended for : BTech EE/BTech VLSI
Prerequisite : Faculty approval
Mutual Exclusion : None

---

1. Preamble:

The students focus on either software or hardware reverse engineering (RE). In the process of RE students understand existing technologies, functions, features, objects, components and systems. By carefully disassembling, observing, testing, analyzing and reporting, students can understand how something works and suggest ways it might be improved. This process requires careful observation, disassembly, documentation, analysis and reporting. Many times, the reverse engineering process is non-destructive. This means that the object or component can be reassembled and still function just as it did before it was taken apart. Throughout the reverse engineering project, the students are able to think of ways these objects could be improved. Is there some way it could function better? or manufactured less expensively? The students will use observations to make suggestions for improvement of the product.
Learning Topics: Forward Engineering Design, Design Thought and Process, Design Steps, System RE, RE Methodology, RE Steps, System level Design, and Examples, Product Development, Product Functions, Engineering Specifications, Product Architecture, Mechanical RE, Computer-Aided RE, Electronic RE, Identify electronic components, PCB RE, Schematic Drawings and Analysis, S/W RE, Reverse Engineering in Computer Applications, Re-engineering of PLC programs.

After the completion of the course, students should be able to:
• Understand basic engineering systems.
• Understand the terminologies related to re-engineering, forward engineering, and reverse engineering.
• Disassemble products and specify the interactions between its subsystems and their functionality
• Understand Reverse Engineering methodologies.
• Understand Reverse engineering of Systems, Mechanical RE, Electronic RE, and Computer RE.

2. Course Modules with quantitative lecture hours:

Topic 1 Introduction to Reverse Engineering, need of Reverse Engineering, understanding of Reverse Engineering through examples, methodologies for Reverse Engineering, Reverse Engineering vs Forward Engineering, steps for Reverse Engineering **(1 hour).**

Topic 2 Mechanical components used in joining (screw fasteners, bolts, nut and washers, compression fittings, pop rivets and rivets), and power transmission (belt drives, chain drives, gear drives and couplings), mechanical tools used in mechanical workshop: measuring tool, fastening-wrenches, fasting screwdrivers, fastening-pliers, cutting tools and striking/driving tools, standards of measurement: primary, secondary, tertiary and working standards, measurement devices: caliper and bevel protector **(1 hour)**.

Topic 3 Top down approach, product information through examples, important electrical/electronics devices: resistor, capacitor, inductor, diode, transistor, operational amplifiers and integrated circuit or microchip, various analysis and quantities, measuring instruments: multi-meter, function generator, oscilloscope, probe and connectors **(1 hour).**

Topic 4 Introduction to engineering drawing, importance of engineering drawing, engineering drawing projections, detailed drawing, assembly drawing and its classification, exploded assembly drawing, advantages of exploded views **(1 hour).**

Topic 5 Importance of engineering drawing in Reverse Engineering, engineering drawing of bench wise, engineering drawing standards in dimensioning, sectional view, tolerance, surface finish and welding, standard codes, engineering drawing format, production drawing of bench wise, Bill Of Material (BOM) **(1 hour).**

Topic 6 Introduction to engineering materials, evolution of engineering materials, classification of engineering materials into metals, non-metals, ceramics and composites, features, identification, examples and applications of different materials, understanding through case studies, introduction to manufacturing processes, classifications of machining and joining process, introduction to casting process, various allowances and types of casting process **(1 hour).**

Topic 7 Demonstration exercise: Reverse Engineering of Electric Kettle **(1 hour).**

Laboratory/practical/tutorial Modules:

4 lab activities will follow the 7 lectures indicated above. In the labs, the students will be disassembling and reassembling some day-to-day devices based on the lectured principles, and provide a report that will typically include

- Explanation of the working mechanism,
- Exploded drawing of the product,
- Assembly and disassembly procedure,
- Bill of Materials (BOM),
- Manufacturing processes and scope of materials,
- Discussion and Scope for Improvement.

The devices used will be (but not limited to) torch, calculator, mouse and DC motor.

3. Text books:

1. Product Design: Techniques in Reverse Engineering and New Product Development by K. Otto and K. Wood Prentice Hall, 2001.

2. Reverse Engineering: An Industrial Perspective by Raja and Fernandes. Springer-Verlag 2008

4. References:

1. Reversing: Secrets of Reverse Engineering by Eldad Eilam Publisher: Wiley (April 15, 2005)
2. The IDA Pro Book: The Unofficial Guide to the World's Most Popular Disassembler by Chris Eagle

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.				

6. Justification of new course proposal if cumulative similarity content is >30%:

Not applicable.